Is There A Future For Digital Terrestrial Broadcast TV?

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It's All Over Now…

- D-Day II (June 12, 2009) has come and gone…
  - NTIA converter program has closed down
  - 64 million requests were made for coupons
  - 32 million were eventually redeemed (as of 07/31/09)
  - DTV stations have moved to final elected channels
  - Lowband VHF stations still have reception issues
  - Some highband VHF stations having problems, too
  - More antennas are being installed to get "free HDTV"

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But…The Erosion Continues

- TV audiences continue to shrink
  - A top-rated TV program in 1989: 30+ million viewers
  - A top-rated TV program in 2009: 15-20 million viewers
  - Average TV program in 2009: 5 to 8 million viewers
  - Many of those are through cable and DBS!
- The market driver for television in 1998: HDTV
- The market driver for television today: The Internet!

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So – What Changed Since 1998?

It’s all about demographics – and
those ‘killer apps!’

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Demographics

- Two key demos for advertisers are:
  - Generation Y (18 to 30 years old)
  - Generation X (31 to 45 years old)
- What's different about them:
  - Boomers are old enough to remember "antenna TV"
  - But Generation X is more familiar with "cable TV"
  - And Generation Y is most familiar with "online TV"

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Demographics

- Generation Y (Millennials)
  - Born after 1980, make up 21% of the labor force
  - Comfortable with technology, grew up with computers
  - Prefer “anywhere, anytime” media consumption
  - Loaded for bear with iPods, laptops, cell phones, cameras
  - For them, “video” can come from any port or connection
  - Big fans of YouTube, Facebook, My Space, Twitter
  - Don’t rent or buy DVDs as much as file sharing and downloads

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Generation X/Y and TV

- They understand and enjoy HDTV, but mostly take it for granted – no big deal
- Not as impressed with it as Baby Boomers are – we remember how bad NTSC looked
- More impressed with digital delivery and all that implies (time and place shifting, recording, sharing)

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The First ‘Killer App’

- Internet connections on HDTVs
  - Most are wired, some adding 802.11
  - Manufacturers build-in “widgets”
  - Streaming from Netflix and YouTube
  - BD players also offer Ethernet ports
  - Lets the viewer access Web video as just another group of TV channels
  - Nielsen study shows Internet video viewing up 45% 2Q’08 to 2Q’09*

*Source: *A2/M2 Three Screens Report*, The Nielsen Company

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Think Anyone’s Worried?

Comcast Corp.'s chief operating officer, Steve Burke, issued a warning to those content providers who sit by idly and complain about online viewing without doing something to change the TV business model. "An entire generation is growing up, (and) if we don't figure out how to change that behavior so it respects copyright and subscription revenue on the part of distributors, we're going to wake up and see cord cutting... (Comcast’s) OnDemand Online trial - offering viewers access to cable channel shows in exchange for identifying themselves as subscribers…is a way to "get in front of the biggest social movement I've ever seen. Online video consumption is off the charts." *(Broadcasting and Cable 10-26-09)*

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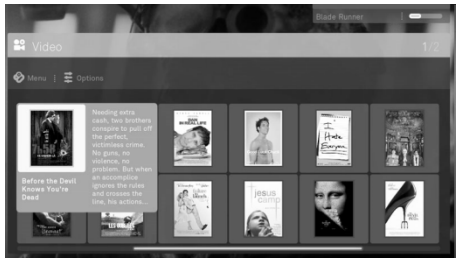
The Second ‘Killer App’

- DVRs and time-shifting
  - Numerous proprietary and PC-based products are killing off “appointment” TV
  - Work equally well with DTTB, cable, DBS, IPTV, Internet TV
  - Disrupting traditional audience metering systems
  - DVRs are now in 36% of all U.S. homes (Leichtman study 09/08)*

TiVo Series 3 DVR



Boxee Main Menu

Apple TV

*Source: *On-demand TV 2009: A Nationwide Study on VOD and DVRs*, Leichtman Research Group, September 2009

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The Third ‘Killer App’

- The “do-it-all” handheld device
  - The future of portable electronics
  - Combines cell phone, Web browsing, digital still/video camera, texting, Twitter, MP3 and video playback
  - Analysts predict these will be the only cell phones sold within five years
- Named the most disruptive technology by PC World (March 2008)

Apple iPhone 3GS

Tough Time for DTTB

- Audiences continue to shrink for traditional (OTA) TV networks and O&Os
- Advertising revenue is slipping (the economy doesn't help)
- Shift away from 'must carry' to 'retrans' agreements
- Pressure to streamline staff and cut costs
- Some station groups wading through red ink
- Yet, Generation X/Y are blissfully unaware!

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So – What's The Solution?

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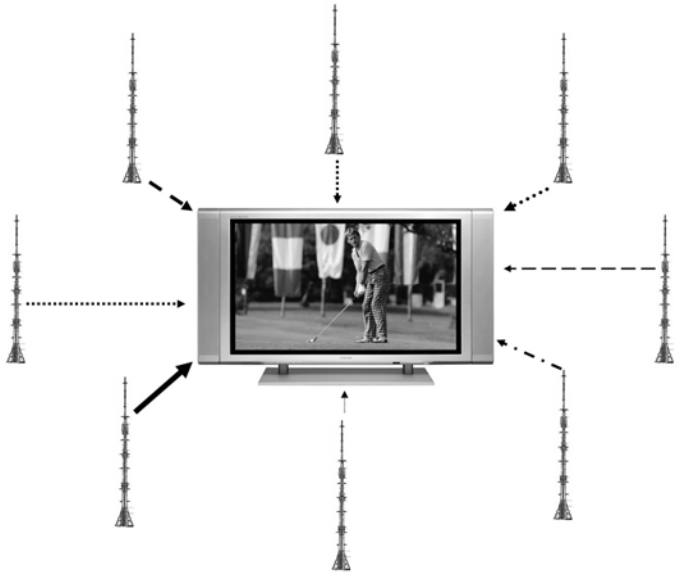
DTTB Still Has Advantages

- DTTB still uses the ‘many serving one’ distribution model
  - Favors the viewer (more choices)
  - Avoids network congestion
  - Decentralization better in case of power outages or emergencies
  - Already employs ‘wireless’ distribution with no extra charge!



DTTB Still Has Advantages

- General perception (true or otherwise) that HDTV picture quality is best from DTTB stations
  - DBS routinely takes hits for compression and image artifacts
  - Cable MSOs also accused of bit-rate stuffing at expense of image
- People want to get “free HDTV” – some are ‘cutting the cord’ and giving up cable packages
  - Increase in awareness that ‘antenna TV’ isn’t archaic or obsolete
  - TREND TO WATCH: Combining DTTB with broadband video, viewed in real time (Hulu), downloaded (Amazon), or streamed (Netflix)

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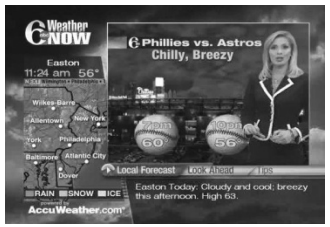
The Challenge to GMs

- To think <u>WAY</u> out of the box on multicasting!
- Typical (ho-hum) multicast:
  - X-1 HD channel @ 12-14 Mb/s
  - X-2 SD channel @ 2-3 Mb/s or HD channel @ 6-8 Mb/s
  - X-3 SD weather/barker < 2Mb/s
  - Revenue stream for X-1 is known
  - Revenue streams for X-2, X-3 are unknown – wishful thinking?

X-1 1280x720 @ 8-10 Mb/s

X-2 1280x720 @ 6–8 Mb/s



X-3 1280x720 @ 6–8 Mb/s

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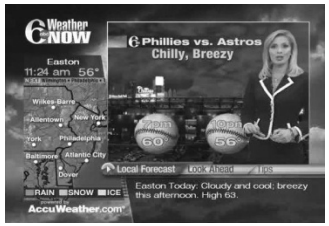
What's Wrong With This Picture?

- Image quality:
  - X-1 picture quality is reduced
  - X-2 picture quality is terrible
  - X-3 picture quality is average but acceptable for a 'barker'
- Revenues:
  - Only X-1 is reliable revenue source
  - X-2 and X-3 depend more on retrans revenue than on ad sales

X-1 1280x720 @ 8-10 Mb/s

X-2 1280x720 @ 6–8 Mb/s



X-3 1280x720 @ 6–8 Mb/s

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Mobile DTV: Half Of The Solution

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Mobile DTV

ATSC MH demo at NAB 2009

- Mobile /handheld DTV (MH)
  - ATSC Standard (A/153)
  - Incorporates vigorous error correction
  - Tested numerous times in all types of RF environments
  - Best suited to small screens (i.e. QVGA resolution)

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MH vs. Cellular

- MH retains the “many serving one” model
  - Content is free to any viewer, anywhere and any time
  - Thousands of channels to choose from across USA
- MediaFLO uses “one serving many” model
  - Content is available only via monthly charge
  - Channel selection depends on service agreements
  - Premium paid for certain channels

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Mobile DTV

- MH streams require about 2.5 – 3 Mb/s apiece
  - Depending on coding, interactivity and multiple audio streams can be included in each program
  - Content coded in AVC (MPEG4) format, can be widescreen
- These services can easily replace low BR minor channels with ‘barker’ and other services
  - Serving up weather, local news, sports scores, traffic updates
  - DTTB stations already do these very well!

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Mobile DTV

- Challenges to Mobile DTV:
  - Some sort of return path is needed for audience metering
  - Content must be formatted specifically for small displays
  - Who will build the handheld receivers?
    - Cell phone manufacturers would be competing with customers
    - However - bundling MH with other services (wireless Internet, MP3, etc) is essential for success of these products
    - MH channels would appear the same way as Internet TV

Mobile DTV

- Technical issues:
  - VHF channels are ill-suited for reception, due to wavelength and frequency issues
  - UHF channels are better suited, due to compact antenna size
  - UHF penetrates buildings better than VHF

TV channel Frequency vs. Antenna Length	*Frequency*	*1/4 wavelength whip*	*1/8 wavelength whip*
LB VHF CH 2	**55 MHz**	**54 inches**	**27 inches**
LB VHF CH 6	**83 Mhz**	**35.5 inches**	**18 inches**
HB VHF CH 7	**175 MHz**	**16.9 inches**	**8.5 inches**
HB VHF CH 13	**211 MHz**	**14 inches**	**7 inches**
UHF CH 14	**471 MHz**	**6.3 inches**	**3.2 inches**
UHF CH 32	**579 Mhz**	**5 inches**	**2.5 inches**
UHF CH 51	**693 MHz**	**4.3 inches**	**2.2 inches**

LB and HB VHF DTTB stations may want to apply for additional UHF translator/repeater channels to carry MH services

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Networked TVs:
The Other Half Of The Solution

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MH + Internet TVs (NeTVs)

- Combine MH with Internet TV in the home
  - Broadcasters can create their own "widgets"
  - "Widgets" lead to specialized program services and minor channels, plus Web pages
  - Viewers can "opt in" to use widgets
  - And their NeTV provides a return path for audience measurement

Don’t Take My Word For It…

A new Ernst & Young report says consumers like (Web-delivered video), and the Web-enabled TVs (NeTVs) that make it possible already are on sale. This year, about 400,000 will be sold in the U.S., and by 2013 about 13.8 million of them will be in American homes, according to the report, which cites Park Associates for the data…Among the top widget applications TV viewers want are those that make it easy to find and watch current episodes, up-to-the minute local weather, the ability to find and watch shows no longer on the air and breaking news headlines. (The Hollywood Reporter, 10-1-09)

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A Better Way

- Now, the mux has three potential revenue sources:
  - X-1 (HD) MPEG2 @ 12-14 Mb/s
  - X-2 MH #1 MPEG4 @ 2.5 Mb/s
  - X-3 MH #2 MPEG4 @ 2.5 Mb/s
- With NeTV “widgets,” all three have return paths
  - Audience measurements are greatly improved

X-1 1280x720 @ 12-14 Mb/s

X-2 MH @ 2.5 Mb/s

X-3 MH @ 2.5 Mb/s

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A Better Way

- Mixing NeTV and MH makes perfect sense
- Broadcasters and networks can also drive viewers to Web sites and secondary content
- Solves the riddles of creating a profitable mux
- Moves away from traditional “channel” model
- The key is getting MH into handheld devices...soon!

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Speaking Of Which…

- Nokia, Samsung Electronics, Sony, Toshiba and Silicon Image have formed the Mobile High-Definition Interface Working Group to create an industry standard for an audio/video interface to connect mobile phones or portable consumer electronics (CE) devices directly to HDTVs and HD displays…The communications protocol is to be based on Silicon Image's Mobile High-Definition Link (MHL) technology. The group intends to offer it as an open standard. The aim is to develop a single-cable with a low pin count interface able to support up to 1080p HD digital video and HD audio, in addition to delivering power to a portable device. ***(CED 9-30-09)***

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DTTB For The Future

- Remember!
  - Baby Boomers don't drive the TV business anymore…
  - Generations X and Y are in the driver's seat now!
    - Future DTTB model must be transparent across multiple platforms
    - Seamless transition between mobile handheld and Internet TV
    - Fully exploits multi-platform content delivery and analytics
    - Content must be optimized for displays (video, audio, length)
    - DTTB retains value of HDTV programming and perceived quality!

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Thank You!

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